DOCUMENT RESUME

ED 064 549 AA 001 028

TITLE	APEX (Air Pollution Exercise) Volume 20: Reference Materials.
INSTITUTION	Environmental Protection Agency, Research Triangle Park, N. C. Office of Manpower Development.
PUB DATE	[71]
NOTE	79p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	City Planning; Computer Assisted Instruction; *Environmental Education; *Land Use; Management Games; *Population Trends; Professional Training; *Regional Planning; Simulated Environment; *Urban Environment

ABSTRACT

The Reference Materials Manual is part of a set of 21 manuals (AA 001 009-001 029) used in APEX (Air Pollution Exercise), a computerized college and professional level "real world" game simulation of a community with urban and rural problems, industrial activities, and air pollution difficulties. For the purposes of the gaming exercise, APEX County, including the urban area of Central City and the surrounding rural districts, is divided into 29 analysis areas. Information and data for each of these analysis areas are presented in this manual. Population, employment and land use are allocated to the areas and are categorized by types established especially for APEX. These types are described in the glossary included in this manual (and in other manuals, except volume 21). The glossary is designed to aid participants in learning the terminology of urban and environmental management as well as that of the gaming exercise. The gamed environment is similar to that found in a typical midwestern industrialized town (the prototype city is Lansing, Michigan), The game simulation procedure and required computer facilities are further described in resumes for AA 001 009 and 001 010. (Author/PR)

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

Environmental Protection Agency

APEX

Air Pollution Exercise

Simulation Exercises

VOLUME 20

REFERENCE MATERIALS

ENVIRONMENTAL PROTECTION AGENCY

APEX VOLUME 20
REFERENCE MATERIALS

This course is designed for professional persons in the field of air pollution control. The course manual has been prepared specifically for the trainees attending the course, and should not be included in the reading lists of periodicals as generally available.

CONDUCTED BY

The Office of Manpower Development's
Institute for Air Pollution Training

ENVIRONMENTAL PROTECTION AGENCY
Office of Air Programs
Office of Manpower Development
Institute for Air Pollution Training
Research Triangle Park
North Carolina 27711

APEX•VOLUME 20
REFERENCE MATERIALS

CONTENTS

SECTION A

General Information	
Institute for Air Pollution Training	V
Acknowledgement	VII
APEX Simulation Exercises	IX

SECTION ONE

Introduction to APEX	1-1
General Interaction Diagram	1-3
APEX Functional Interactions - Simulations	1-5
APEX Functional Interactions - Roles	1-7

SECTION TWO

Analysis Areas 1, 2, 3 and 4	2-1

SECTION 3

Analysis Areas 5, 6, 7 and 8	3-1

SECTION 4

Analysis Areas 9, 10, 11 and 12	4-1

SECTION 5

Analysis Areas 13, 14, 15 and 16	5-1

SECTION 6

Analysis Areas 17, 18, 19 and 20	6-1

SECTION 7

Analysis Areas 21, 22, 23 and 24	7-1

SECTION 8

Analysis Areas 25, 26, 27, 28 and 29	8-1

SECTION 9

Map of 29 APEX Analysis Areas	9-1

LIST OF MANUALS USED IN THE APEX GAME SIMULATION

Volume 1: Game Director's Manual

Volume 2: Computer Operator's Manual

Volume 3: Air Pollution Control Officer's Manual

Volume 4: City Politician's Manual

Volume 5: County Politician's Manual

Volume 6: Industrialist's Manual: No. 1, Shear Power Company

Volume 7: Industrialist's Manual: No. 2, People's Pulp Plant

Volume 8: Industrialist's Manual: No. 3, Rusty's Iron Foundry

Volume 9: Industrialist's Manual: No. 5, Caesar's Rendering Plant

Volume 10: Industrialist's Manual: No. 6, Dusty Rhodes Cement Co.

Volume 11: Developer's Manual: No. 1

Volume 12: Developer's Manual: No. 2

Volume 13: Developer's Manual: No. 3

Volume 14: Developer's Manual: No. 4

Volume 15: Developer's Manual: No. 5

Volume 16: Developer's Manual: No. 6

Volume 17: Developer's Manual: No. 7

Volume 18: City Planner's Manual

Volume 19: County Planner's Manual

Volume 20: Reference Materials

Volume 21: Legal References: Air Pollution Control Legislation

ENVIRONMENTAL PROTECTION AGENCY

Office of Air Programs • Office of Manpower Development,
Institute for Air Pollution Training

The Institute for Air Pollution Training (1) conducts training for the development and improvement of State, regional, and local governmental air pollution control programs, (2) provides consultation and other training assistance to governmental agencies, educational institutions, industrial organizations, and others engaged in air pollution training activities, and (3) promotes the development and improvement of air pollution training programs in educational institutions and State, regional, and local governmental air pollution control agencies.

One of the principal mechanisms utilized to meet the Institute's goals is the intensive short term technical training course. A full time professional staff is responsible for the design, development and presentation of these courses. In addition the services of scientists, engineers and specialists from other EPA programs, governmental agencies, industry, and universities are used to augment and reinforce the Institute staff in the development and presentation of technical material.

Individual course objectives and desired learning outcomes are delineated to meet specific training needs. Subject matter areas covered include process evaluation and control, atmospheric sampling and analysis, field studies and air quality management. These courses are presented in the Institute's resident classroom and laboratories and at various field locations.

Harry P. Kramer, Sc. D.
Director, Office of Manpower Development

ACKNOWLEDGEMENT

A cooperative effort of
The Comex Research Project
School of Public Administration
University of Southern California
Los Angeles, California

Dr. K. William Leffland,
Principal Investigator

Richard K. McGinty,
Project Director

Alan Kreditor,
Research Design

Ira Robinson,
Research Design

And
The Environmental Simulation Laboratory
School of Natural Resources
University of Michigan
Ann Arbor, Michigan

Dr. Richard D. Duke,
Principal Investigator

Roy I. Miller,
Project Director

Steward D. Marquis,
Research Design

Donald F. Kiel,
Systems Analyst

Developed under a Grant from
The Environmental Protection Agency
Office of Air Programs
Research Triangle Park, North Carolina

STAFF

Aubrey Boyd

Jolene Elliott

Corinne Floyd

Alan Forrest

Mark James

Frank King

Paula Magzamin

Charles Pratt

Gilbert Siegel

STAFF

Thomas Borton

Anne E. Cochran

Ferdinand Dijkstra

Katherine Fenn

David Kaueper

Marilyn Miller

Ellen Pechman

James Reeds

David Specht

APEX

Air Pollution Exercise

Simulation Exercises conducted by the Institute for Air Pollution Training

The responsibility of the Federal Government's Office of Air Programs to provide leadership and assistance to State and local air pollution control agencies in the recruitment and development of qualified personnel is a major theme of the 1970 Clean Air Act. The Office of Air Programs, (OAP) in conjunction with the University of Southern California and the University of Michigan, has created and developed a simulation exercise identified as APEX (Air Pollution Exercise). This exercise establishes a dynamic atmosphere in which the trainees participate in a "real world" simulation involving a community with urban and rural problems, industrial activities, and a variety of air pollution control problems.

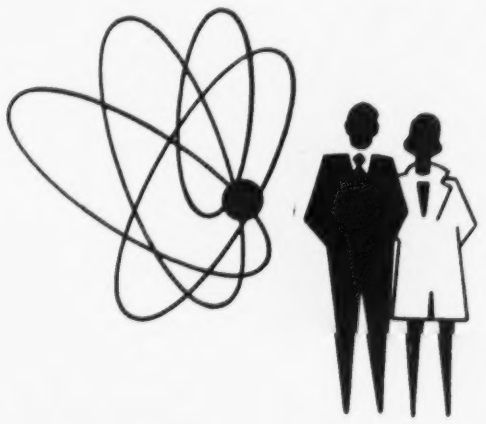
Current and projected uses of APEX have been developed through several of the University Consortia established in conjunction with OAP's Office of Manpower Development.

The use of simulation exercises for the training of air pollution control professionals offers two immediate and vital benefits:

1. A means is provided for a working application of theoretical knowledge; the learner applied information and skills to "real life"

situations. In addition, motivation directed toward additional learning results from participation in seeking solutions to the problems.

2. The focus is provided for solving problems through an interdisciplinary approach, where the interrelationship between "formal" areas of study and application becomes evident.



Students participating in APEX assume the roles of a number of decision makers: city and county politicians, city and county planners, developers, industrialists, air pollution control officers, and concerned citizens. Realistic data are supplied for each role, and the students are required to make decisions that are then analyzed by the computer. Next, the results of the decisions are presented as new situational data representing a year of "actual time." Students participating in these programs — which place special emphasis on air pollution problems —— employ a wide range of skills and knowledge in a variety of areas. Additional opportunities for growth are provided through seminars, lectures, texts, and working contact with recognized authorities in a number of professions.

Within the overall format of the simulation exercise, emphasis is placed upon specific areas through the use of special situations, for example, hearings on air pollution standards or legal actions brought against a particular industry.

Additionally, preparations are underway to introduce APEX as a graduate course at OAP's new Technical Center in the fall of 1971 for students from the Triangle Universities Consortium. In addition to its use at the University of Southern California, APEX is now being conducted as a graduate course at the University of Illinois at Urbana and at Harvard University as part of an Environmental Education program for both graduate and undergraduate studies.

Section 1-1

Introduction to - APEX

APEX is one of, if not the most complex gaming-simulations of an urban area in use today. Although it was designed to supplement standard teaching methods, APEX is far more than an educational tool. It is a communication channel of a new kind -- capable of providing both the language and the forum for information transfer between persons and groups with different educational and cultural backgrounds as well as different prespectives on urban life.

APEX is composed of two essential components (1) a computerized system made up of a series of well-integrated simulation models (2) linked to a "gamed" environment encompassing a series of interactive roles. The computerized system predicts the changes that occur in several sectors of urban life in response to the decisions made by participants in the "gamed" environment, decisions made by persons outside the "gamed" environment (other actors whose behavior is simulated in the computer), and external pressures on the city (also simulated in the computer).

The county of APEX is run year by year by a set of elite decision makers performing both the mundane and extraordinary functions of their office in the "gamed" environment. Each cycle or year is condensed in time to a three to eight hour session during which the decision makers formulate their yearly policy. The decisions that emerge out of the "competitive-cooperative" environment of the gaming-simulation are used as priming inputs to the computer simulation. The change in the status of the urban area is calculated by the computer and returned to the decision makers as the primary input to the next cycle of action. Included in the change picture generated by the computer are selected social indicators measuring the magnitudes of change in assorted key areas and a newspaper serving as the focal point of local public opinion.

The key decision makers acting in the gamed environment include politicians and planners from a central city and a county, an air pollution control officer from the county, and land developers and industrialists from the private sector. The politicians are responsible for the administration of their respective jurisdictions and for the formulation and implementation of various programs to upgrade the social status of their constituents. The planners serve as aides to the politicians and represent the major long range coordinating force in the community. The air pollution control officer is charged with the task of cleaning and monitoring the air mass above APEX county. The land developers and industrialists have the responsibility of running their particular business concerns within the confines of the county. It is expected that each decision maker will find it to his advantage to coordinate and/or compete with other players in his efforts to promote his strategies. The APEX General Interaction Diagram included here (see page) indicates possible linkages among players and between players and the simulation.

In general, people have great difficulty understanding the dynamics of a complex system through traditional means. Gaming-simulation offers participants the opportunity to study, work with, and discuss the struc-

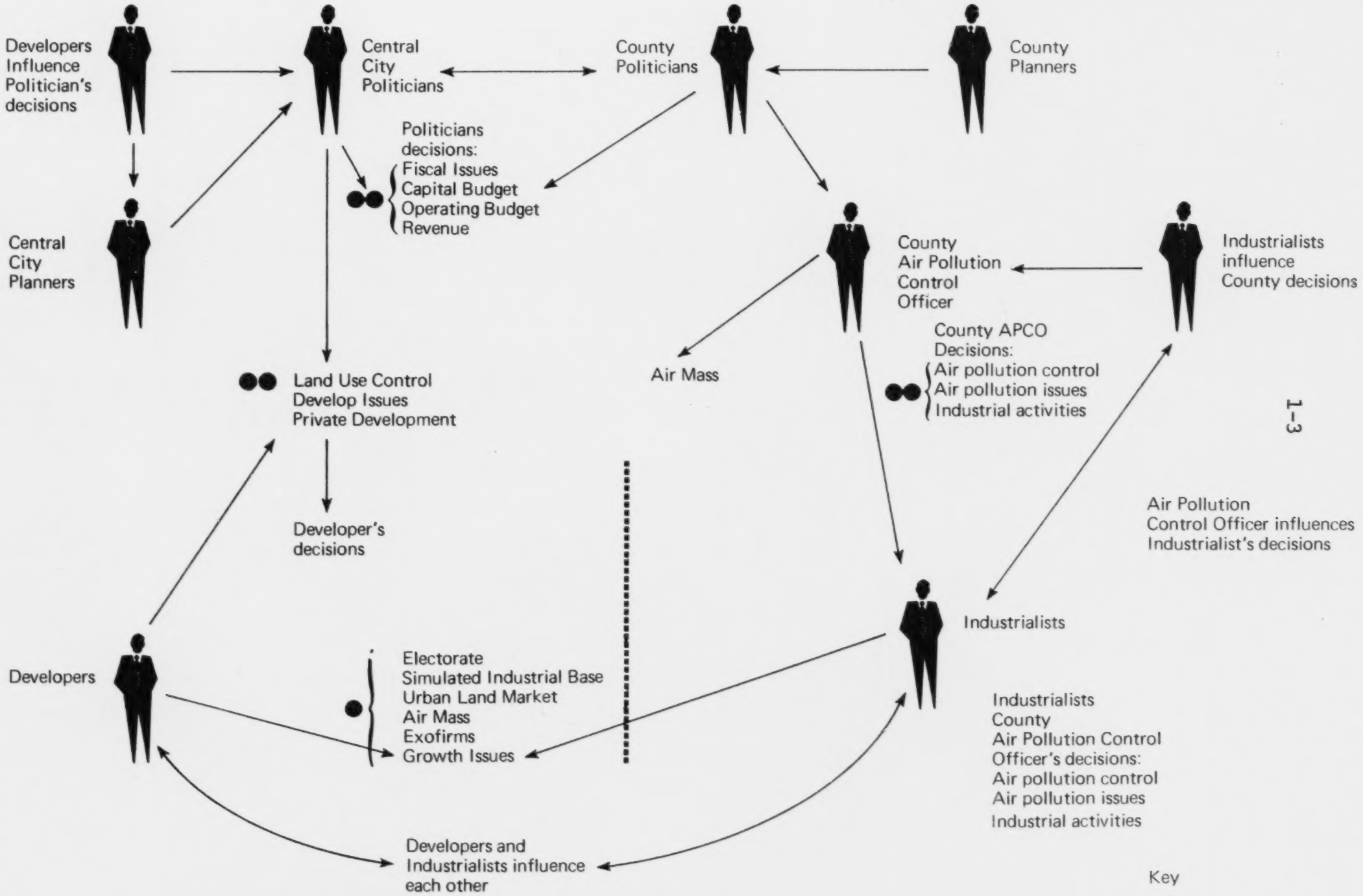
ture of such a system and to experiment with intervention strategies designed to change that structure. When used as a teaching device, the strength of a gaming-simulation such as APEX lies in the opportunity afforded participants for involvemnt in the system. When compared with the passive observation of the system offered by traditional methods, this approach has had great success.

In theory, complex gaming-simulation of the APEX variety is more than a training device or communications facilitator. If the models were more sophisticated the data base more accurate and more complete, a complex gaming-simulation would be a policy testing device for use by practicing urban politicians, planners, APCO's and administrators. Conditional predictions (predictions based on the particular policies and/or decisions submitted to the model) of the ramifications of various decisions can be generated through the use of a complex gaming-simulation -- predictions that may forewarn the model user of unforeseen reactions to policy at several levels of the urban hierarchy ranging from that of the highest level.

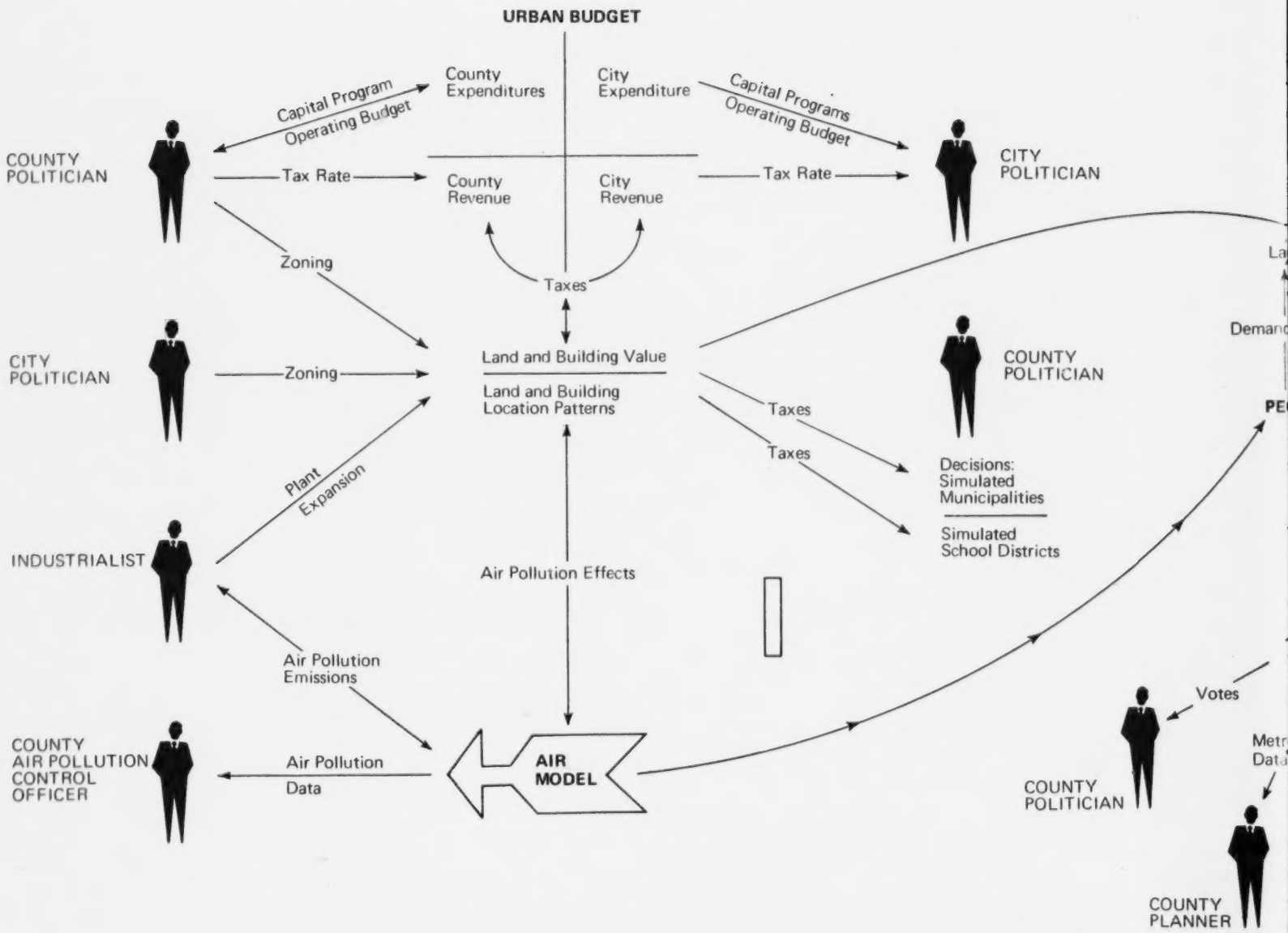
The gamed environment is similar to that found in a typical midwestern industrialized town. (In fact, the prototype city is Lansing, Michigan). It has a population approaching 220,000 including several of minority groups sharing racial or ethnic ties. There is a relatively dense central city in the heart of the county, an adjacent suburb and two outlying townships. Most of the industry is located in the central city (as are the minority groups). Major firms include a large auto plant and the state government offices. The suburb houses a major university. The townships are largely agricultural, although urbanizing settlements are dotting the landscapes. There is a major river running through the city serving as the primary drainage system for the county. The climate of APEX is temperate, with summer temperatures averaging about 70 degrees and winter temperatures averaging near 25 degrees. Prevailing winds are westerly, swinging to the southwest in summer and northwest in winter.

For the purposes of the gaming exercise, APEX county is divided into 29 analysis areas (see the attached map, Section 9). Population, employment and land use will be allocated to the areas and are categorized by types established especially for APEX. These types are described in the glossary included in this manual (Section 2) a glossary designed to aid participants in learning the terminology of urban and environmental management as well as that of the gaming exercise.

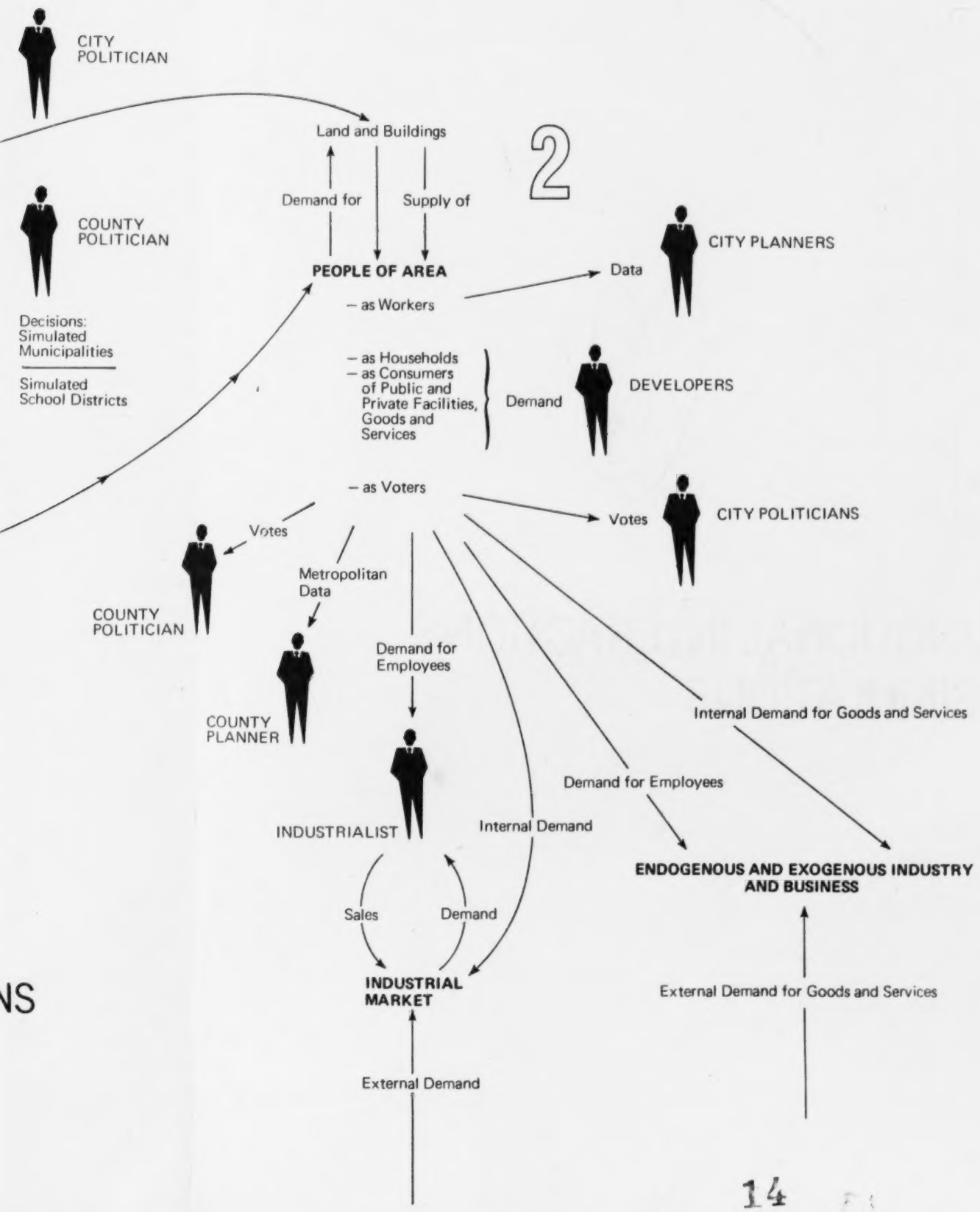
FOR ADDITIONAL INFORMATION:
Address inquiries to Chief, Institute for Air Pollution Training
Environmental Protection Agency
Research Triangle Park, North Carolina 27711



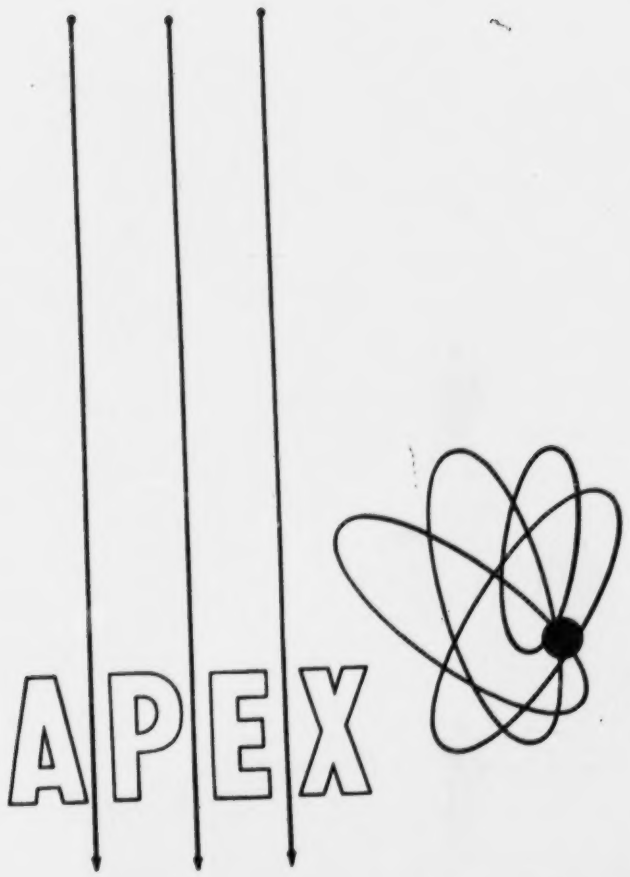
APEX GENERAL INTERACTION DIAGRAM



APEX FUNCTIONAL INTERACTIONS ● SIMULATIONS

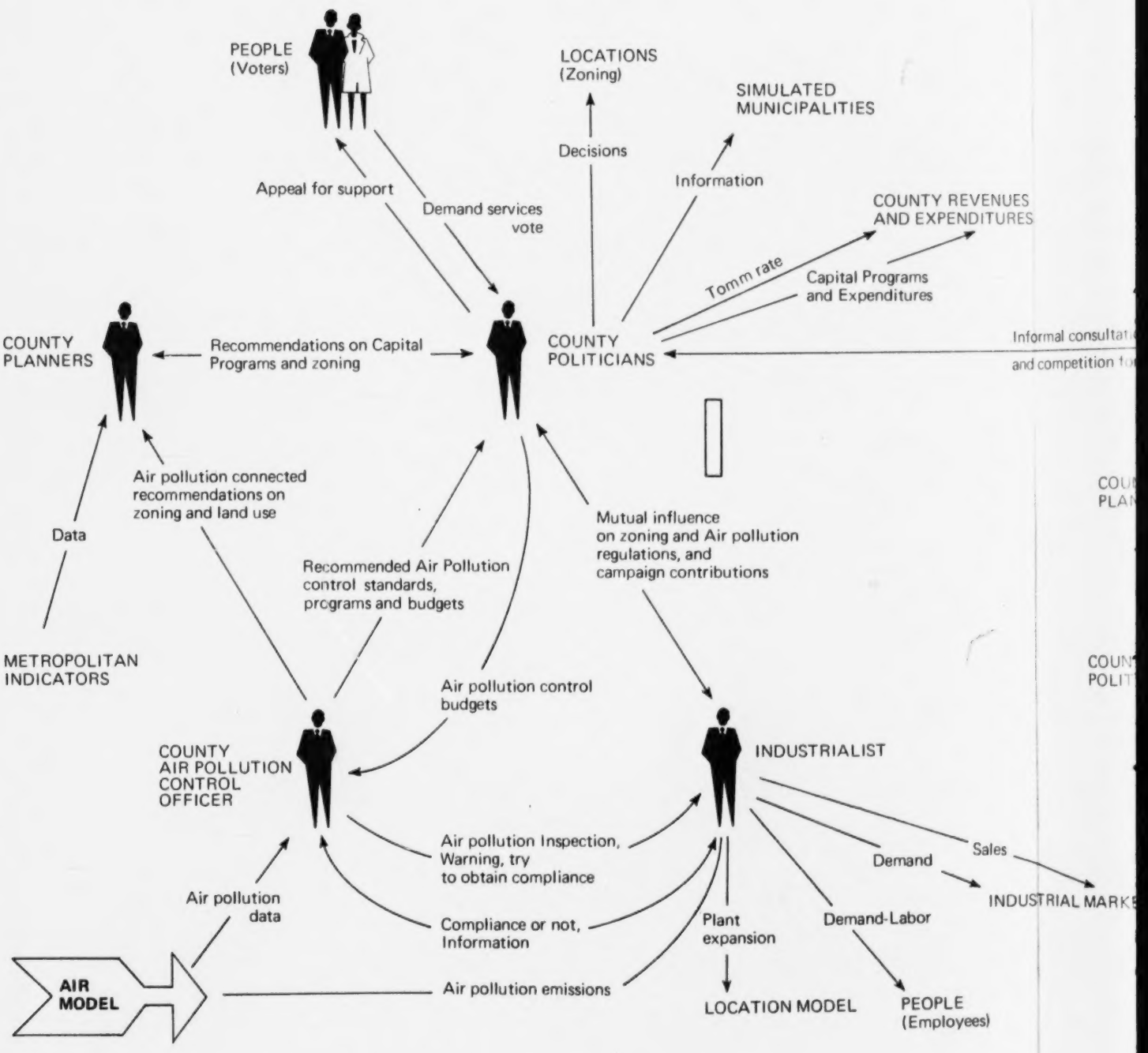

CITY POLITICIAN
COUNTY POLITICIAN
Decisions:
Simulated Municipalities
Simulated School Districts
Land and Buildings
Demand for
Supply of
2
PEOPLE OF AREA
– as Workers
Data
CITY PLANNERS
– as Households
– as Consumers of Public and Private Facilities, Goods and Services
Demand
DEVELOPERS
– as Voters
Votes
CITY POLITICIANS
Votes
COUNTY POLITICIAN
Metropolitan Data
COUNTY PLANNER
Demand for Employees
Internal Demand for Goods and Services
Demand for Employees
INDUSTRIALIST
Internal Demand
ENDOGENOUS AND EXOGENOUS INDUSTRY AND BUSINESS
Sales
Demand
INDUSTRIAL MARKET
External Demand for Goods and Services
External Demand

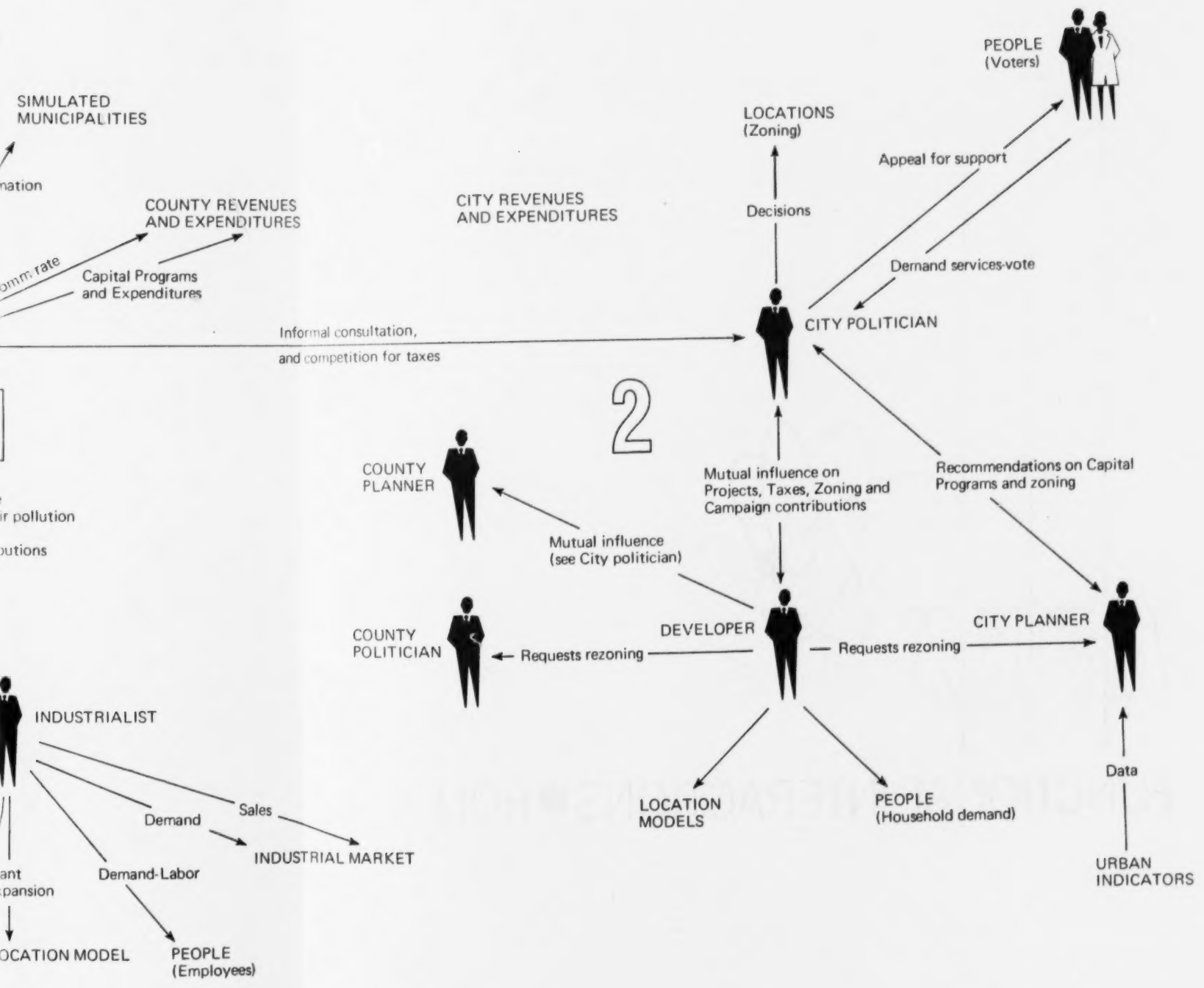
NS



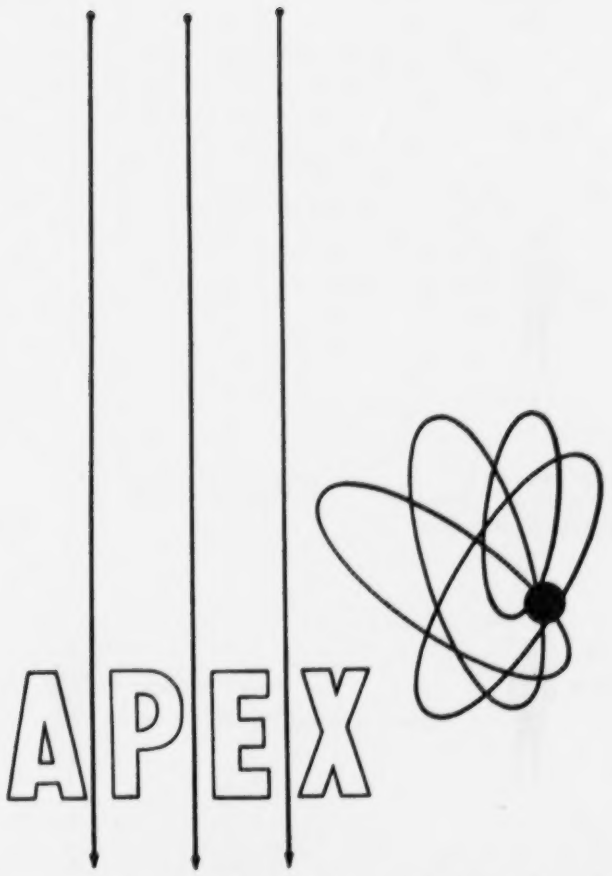
FUNCTIONAL INTERACTIONS

- SIMULATIONS


PEOPLE
(Voters)
LOCATIONS
(Zoning)
SIMULATED
MUNICIPALITIES
Decisions
Information
Appeal for support
Demand services
vote
COUNTY REVENUES
AND EXPENDITURES
Tomm rate
Capital Programs
and Expenditures
COUNTY
PLANNERS
Recommendations on Capital
Programs and zoning
COUNTY
POLITICIANS
Informal consultat
and competition fo
Air pollution connected
recommendations on
zoning and land use
Data
Recommended Air Pollution
control standards,
programs and budgets
Mutual influence
on zoning and Air pollution
regulations, and
campaign contributions
METROPOLITAN
INDICATORS
Air pollution control
budgets
COUNTY
AIR POLLUTION
CONTROL
OFFICER
INDUSTRIALIST
Air pollution Inspection,
Warning, try
to obtain compliance
Sales
Demand
INDUSTRIAL MARKE
Air pollution
data
Compliance or not,
Information
Plant
expansion
Demand-Labor
AIR
MODEL
Air pollution emissions
LOCATION MODEL
PEOPLE
(Employees)



APEX FUNCTIONAL INTERACTIONS ● ROLES



FUNCTIONAL INTERACTIONS ● ROLES

2-1

ANALYSIS AREA 1

Analysis Area 1 is overwhelmingly middle class in character, possessing new single-family homes of good quality plus a few apartments. Most blue collar workers in the area are skilled and own their own homes. Nearly all housing is in subdivisions less than fifteen years old. Commercial development is of the strip type along Grand River running from east to northwest and along Saginaw running east-west along the southern edge. Some heavy machinery plants are located in the Southeast corner, otherwise the area is a net exporter of workers. Most of the area is gently rolling with an abundance of trees, and there are several fine parks. Public facilities and schools are in good condition. The area is stable and past its major growth era.

The initial population of households is distributed among the five household types as follows:

Type I -- 28.0%
Type II -- 25.6%
Type III -- 24.9%
Type IV -- 18.7%
Type V -- 2.8%

The overall residential density is 3.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 21.8%
R-2 -- 24.8%
R-3 -- 18.4%
M-1 -- 18.9%
M-2 -- 15.8%

Of a total land area for analysis area 1 of 1587 acres, 36% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential..... 62%
Multiple-family residential.... 3%
Commercial..... 10%
Industrial..... 11%
Office..... less than 1%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 1

Inventory of Public Facilities

City Parks and Buildings:

Tecumseh Park (24 acres)

A Branch Library

There are approximately 34 miles of public streets, 23 miles of sewer lines, and 30 miles of public water mains.

Public Schools:

Northwestern Elementary School, built in 1939, 12 rooms on 4.8 acres
Horsebrook Elementary School, built in 1952, 7 rooms on 10 acres
Cumberland Elementary School, built in 1957, 10 rooms on 6.5 acres
Windemere View Elementary School, built in 1959, 14 rooms on 8.2 acres

County Property:

None

State owned and quasi-public land accounts for approximately 61.5 acres.

ANALYSIS AREA 2

Analysis Area 2 is overwhelmingly blue collar, and contains a very high percent of automobile plant workers. It also has over 50% persons who are over 50 years old. The eastern half is one of the oldest residential areas in town, with many 50 to 100 year old houses that have been kept in relatively good repair over the years. The eastern and northern edges contain many small factories and stores, and is being considered as an industrial corridors to the outrage of many elderly residents. The northwest corner contains warehouses for the automobile plants. The rest of the northwestern area contains older post-World War II subdivisions. The whole southern half is slowly becoming Negro, a process of succession that began a decade ago--but so far there is little friction over it.

The initial population of households is distributed among the five household types as follows:

Type I -- 11.3%
Type II -- 15.0%
Type III -- 28.5%
Type IV -- 35.1%
Type V -- 10.1%

The overall residential density is 7.8 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 11.6%
R-2 -- 21.9%
R-3 -- 26.5%
M-1 -- 16.2%
M-2 -- 23.5%

Of a total land area for analysis area 2 of 1528 acres, 22% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single family residential.....	31%
Multiple-family residential.....	7%
Commercial.....	10%
Industrial.....	13%
Office	3 %

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 2

City Parks and Buildings:

Comstock Park (13 acres)
Durant Park (3 acres)
Ferris Park (6 acres)
Hull Court Park (1.1 acres)
Bassett Park (3.6 acres)
Edmore Park (.4 acre)
Larch Street Park (.5 acre)
Reasoner Park (5.9 acres)

Sewage Treatment Plant (Providing Secondary Treatment)
Fire Station
Community Center

There are approximately 39 miles of public streets, 32.7 miles of sewer lines and 29.4 miles of public water mains.

Public Schools:

Cedar Elementary School, built in 1917, 9 rooms on .6 acre
Willow Elementary School, built in 1952, 18 rooms on 6.2 acres
Walnut Elementary School, built in 1925, 19 rooms on .6 acre
Genesee Elementary School, built in 1912, 9 rooms on 1.2 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 119 acres.

ANALYSIS AREA 3

Analysis Area 3 is an area in transition, and of very mixed character. The eastern half was originally the elite enclave where the oldest industry-founding families have their homes. It is now occupied largely by middle class Negroes and by older white professional families with ties to the area. Property values are slowly declining. The center of the area is an enormous auto body plant. By contrast, the western half is still developing, especially with new tract subdivisions of small blue collar homes, many of whose residents exhibit strong fear of Negroes. A public golf course is on the west side. Along the south and southwest, commercial development follows the arterials.

The initial population of households is distributed among the five household types as follows:

Type I -- 17.6%
Type II -- 18.4%
Type III -- 28.7%
Type IV -- 29.3%
Type V -- 6.0%

The overall residential density is 6.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 15.3%
R-2 -- 23.6%
R-3 -- 23.6%
M-1 -- 17.4%
M-2 -- 20.1%

Of a total land area for analysis area 3 of 1340 acres, 11.8% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	41.6%
Multiple-family residential.....	4.0%
Commercial.....	2.7%
Industrial.....	13.6%
Office.....	0.6%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 3

Inventory of Public Facilities

City Parks and Buildings:

West Michigan Avenue Park (28.2 acres)
Grand River Park (42.1 acres)
Dunnebacke Park (6.0 acres)
St. Joseph Street Park (18.8 acres)
Waverly Hills Golf Course (87.7 acres)

Fire Station

There are approximately 29 miles of public streets, 22.4 miles of sewer lines and 26.5 miles of public water mains.

Public Schools:

Main Elementary School, built in 1929, 14 rooms on 2 acres
Verlinden Elementary School, built in 1930, 11 rooms on 3.2 acres
Stoner Elementary School, built in 1927, 18 rooms on 20 acres
Waverly Junior High School, built in 1962, 41 rooms on 33 acres
Sexton High School, built in 1943, 66 rooms on 29.8 acres

County Property:

None

ANALYSIS AREA 4

Analysis Area 4 is the oldest, poorest, Blackest, most industrial area in town. The site of one of the largest automobile plants in the world, it imports 18,000 workers daily. The plant pollutes the river and the air extensively. The residents of the area are poor and overwhelmingly Negro. Residential areas are run down single-family homes that now often hold 3 or 4 families. Streets, sewers and water mains are very old, and in poor repair. The streets St. Joseph and Main are a one-way pair that may soon be widened to ease traffic congestion, possible dispossessing many families in the process. Commercial buildings are either new office buildings or "ma-and-pa" stores.

The initial population of households is distributed among the five household types as follows:

Type	I	5.8%
Type	II	10.1%
Type	III	24.5%
Type	IV	46.6%
Type	V	13.0%

The overall residential density is 10.4 households per developed residential acre. The population is found in the five residential development types as follows:

R-1	7.3%
R-2	20.4%
R-3	30.7%
M-1	14.0%
M-2	27.6%

Of a total land area for analysis area 4 of 481 acres, 0.6% is vacant initially. The privately owned land is developed and zoned for development according to the following percentages:

Single-family residential.....	35.8%
Multiple-family residential.....	5.4%
Commercial.....	16.6%
Industrial.....	9.7%
Office.....	0.4%

There is no agricultural land in analysis area 4.

(continued next page)

ANALYSIS AREA 4

Inventory of Public Facilities

City Parks and Buildings:

Lincoln Playground (1.2 acres)'
Scott Park (8.8 acres)

Fire Station #3
Community Center

There are approximately 15 miles of public streets, 13.4 miles of sewer lines and 13.6 miles of public water mains.

Public Schools:

Michigan Elementary School, built in 1916, 11 rooms on 1.2 acres
Kalamazoo Elementary School, built in 1924, 21 rooms on 0.7 acre
Lincoln Elementary School, built in 1935, 8 rooms on 0.8 acre
West Junior High School, built in 1920, 51 rooms on 0.7 acre

County Property:

None

State owned and quasi-public land accounts for approximately 24 acres.

ANALYSIS AREA 5

Analysis Area 5 is overwhelmingly blue collar in character, and possesses a large Mexican-American population. Running north and south through the center of the area is an old industrial corridor, with many large and small factories that are over 60 years old. The northern half of the area was annexed only ten years ago, although it is an old blue collar area. It was rural non-farm in character, with many owner-built homes, poor public facilities and unplanned growth. Housing age ranges from 80 years old in the southern part to 20 years old in the northern part. The eastern edge of the area is an enormous park left largely in its natural state with pleasant woods.

The initial population of households is distributed among the five household types as follows:

Type I -- 6.9%
Type II -- 10.3%
Type III -- 29.2%
Type IV -- 43.3%
Type V -- 10.3%

The overall residential density is 7.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 8.4%
R-2 -- 21.9%
R-3 -- 29.9%
M-1 -- 14.9%
M-2 -- 24.9%

Of a total land area for analysis area 5 of 1697 acres, 23% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	40.4%
Multiple-family residential.....	8.8%
Commercial.....	0.9%
Industrial.....	10.3%
Office.....	1.1%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 5

Inventory of Public Facilities

City Parks and Buildings:

Seventh Avenue Park (1.6 acres)
Filley Park (2.2 acres)
Gier Park (44 acres)
Croesbeck Gold Course (104.7 acres)
Paulson Park (22.5 acres)
Ormond Park (10.9 acres)
Marshall Field (13 acres)
Porter Playfield (9.7 acres)
Bencroft Park (50 acres)

Fire Station #6
A Branch Library

There are approximately 30 miles of public streets, 30.1 miles of public sewer lines and 30.7 miles of public water mains.

Public Schools:

Gier Park Elementary School, built in 1953, 12 rooms on 5 acres
High Elementary School, built in 1924, 13 rooms on 1 acre
Fairview Elementary School, built in 1954, 12 rooms on 9 acres
Grand River Elementary School, built in 1961, 18 rooms on 2 acres
Otto Junior High School, built in 1937, 51 rooms on 15.2 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 24 acres.

ANALYSIS AREA 6

Analysis Area 6 is a recently incorporated area that is typical of fringe areas that have grown up over long periods. Located in the corridor between Central City and Suburb, the southern half contains older middle class and blue collar areas that have slowly grown over the last half century. The central section is new upper middle class subdivisions and apartment complexes that had been clamoring for city services. The northern section is largely empty, but being rapidly developed. Along the eastern edge is a large regional shopping center that takes advantage of its central location between City and Suburb. The southern half is cross cut by east-west and north-south freeways, so that this is one of the most accessible areas. Public facilities are of very uneven quality in the area.

The initial population of households is distributed among the five household types as follows:

Type I -- 21.7%
Type II -- 17.7%
Type III -- 25.2%
Type IV -- 27.8%
Type V -- 7.6%

The overall residential density is 4.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 16.9%
R-2 -- 23.6%
R-3 -- 23.2%
M-1 -- 16.7%
M-2 -- 19.6%

Of a total land area, for analysis area 6 of 2333 acres, 30% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	47.6%
Multiple-family residential.....	5.5%
Commercial.....	7.9%
Industrial.....	0.9%
Office.....	0.3%
Agricultural.....	19.8%

(continued next page)

ANALYSIS AREA 6

Inventory of Public Facilities

City Parks and Buildings:

Wood Street Park (18 acres)
119th Street Playfield (6.8 acres)
Ranney Park (18.4 acres)
Red Cedar Golf Course (56.1 acres)

Fire Station #8
City Hall

There are 32 miles of public streets, 24.1 miles of sewer lines, and 25.4 miles of public water mains.

Public Schools:

Community Elementary School, built in 1860, 5 rooms on 2.7 acres
Foster Elementary School, built in 1917, 20 rooms on 1.6 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 9 acres.

ANALYSIS AREA 7

Analysis area 7 is a blue collar area with a very high percentage of apartments running through its center. In the southern third is an area of very small, old single-family worker's homes, all aged 60-80 years old. Running east and west through the northern third are two major arterials. At the extreme southern end is the city's most heavily used large park, with a zoo. At the extreme northern end is a boys' reformatory. Also in the center is the largest hospital in the metropolitan area. Public facilities are old and in poor repair in many parts of the area.

The initial population of households is distributed among the five household types as follows:

Type I -- 8.3%
Type II -- 13.6%
Type III -- 30.3%
Type IV -- 38.9%
Type V -- 8.9%

The overall residential density is 8.6 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 9.8%
R-2 -- 22.0%
R-3 -- 27.7%
M-1 -- 16.1%
M-2 -- 24.4%

Of a total land area for analysis area 7 of 1128 acres, 2.9% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	32.2%
Multiple-family residential.....	9.3%
Commercial.....	6.2%
Industrial.....	2.5%
Office.....	2.1%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 7

Inventory of Public Facilities

City Parks and Buildings:

Foster Park (4 acres)
Hunter Park (14 acres)
Stabler Park (5.9 acres)
Walsh Park (4 acres)
Potter Park (102 acres)

Zoo
Community Center

There are 29 miles of public streets, 30.1 miles of sewer lines, and 21.6 miles of public water mains.

Public Schools:

Allen Elementary School, built in 1913, 25 rooms on 1.2 acres
Bingham Elementary School, built in 1956, 11 rooms on 0.6 acre
Holmes Elementary School, built in 1923, 16 rooms on 1.4 acres
Pattengill Junior High School, built in 1921, 45 rooms on 3 acres
Eastern High School, built in 1928, 71 rooms on 3 acres

County Property:

County Hospital on 19 acres

State-owned and quasi-public land accounts for 120 acres, much of it taken by a State boys' training school.

ANALYSIS AREA 8

Analysis Area 8 is the Central Business District and the government offices Area. It is also the oldest area of town, and has had several small urban renewal projects. Small pockets of older residential areas are fast giving way to apartment houses and to office buildings. Slums are apartment slums, unlike the shack slums of other areas. This is the highest density area of town. The electrical powerhouse, a warehouse district and light industry run north-south along the river, paralleling the railroad tracks. Public facilities are old and often overloaded.

The initial population of households is distributed among the five household types as follows:

Type I -- 7.3%
Type II -- 10.3%
Type III -- 22.3%
Type IV -- 44.5%
Type V -- 15.6%

The overall residential density is 11.3 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 7.9%
R-2 -- 19.6%
R-3 -- 30.4%
M-1 -- 14.4%
M-2 -- 27.7%

Of a total land area for analysis area 8 of 1122 acres, 1.6% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	17.9%
Multiple-family residential.....	2.6%
Commercial.....	14.2%
Industrial.....	15.3%
Office.....	2.0%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 8

Inventory of Public Facilities

City Parks and Buildings:

Elm Park (5.5 acres)
Reutter Park (3 acres)
River Street Park (3.3 acres)
Oak Park (18.3 acres)
Moores Park (5 acres)

Fire Station #5
Fire Station #1
Water Filtration and Pumping Station
Central Library
Art Gallery
Cedar Street Community Center
Michigan Historical Commission Museum

There are 30 miles of public streets, 29.9 miles of sewer lines, and 28.8 miles of public water mains.

Public Schools:

Oak Park Elementary School, built in 1916, 11 rooms on 0.8 acre
Moores Park Elementary School, built in 1958, 12 rooms on 1.1 acres
Christiancy Elementary School, built in 1914, 11 rooms on 1.5 acres

County Property:

County Building complex: offices
Court House
Sheriff's station

State-owned and quasi-public land accounts for approximately 117 acres, most of it State Capital complex.

ANALYSIS AREA 9

Analysis Area 9 is an upper class and middle class area. The northern half contains one of the two elite enclaves of the metropolitan area, next door to the most prestigious country club in town. Also in the north, a fine park that is converted from an old estate overlooks the river. The southern half of the area is a set of subdivisions and town houses ranging in age from five to ten years, catering to young professionals and managers. Public facilities are of very high quality.

The initial population of households is distributed among the five household types as follows:

Type I -- 40.5%
Type II -- 18.6%
Type III -- 19.7%
Type IV -- 16.0%
Type V -- 5.2%

The overall residential density is 2.6 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 25.9%
R-2 -- 29.7%
R-3 -- 20.9%
M-1 -- 15.3%
M-2 -- 8.2%

Of a total land area for analysis area 9 of 800 acres, 16.3% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	59.7%
Multiple-family residential.....	2.4%
Commercial.....	0
Industrial.....	0
Office.....	0
Agricultural.....	0

(continued next page)

ANALYSIS AREA 9

Inventory of Public Facilities

City Parks and Buildings:

Averill Park (7.4 acres)
Lewton Park (2.0 acres)
Frances Park (57.8 acres)

No city buildings

There are approximately 14 miles of public streets, 14.3 miles of sewer lines, and 12.9 miles of public water mains.

Public Schools:

Lewton Elementary School, built in 1957, 12 rooms on 7 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 199 acres.

ANALYSIS AREA 10

Analysis Area 10 is a lower-middle income area of mixed residential character, which is fairly evenly split between white collar and blue collar households. The anlaysis area has three segments, east, west and center. Running north-south through the center of the area is the most important southern arterial of the region, along which is a heavy concentration of strip commercial development. The central portion of the analysis area is older and predominately blue collar. The eastern and western thirds are newer and predominately white collar areas.

The initial population of households is distributed among the five household types as follows:

Type I -- 16.6%
Type II -- 19.9%
Type III -- 32.7%
Type IV -- 25.9%
Type V -- 4.9%

The overall residential density is 7.3 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 15.6%
R-2 -- 24.1%
R-3 -- 22.3%
M-1 -- 18.4%
M-2 -- 19.6%

Of a total land area for analysis area 10 of 1726 acres, 4.6% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	41.4%
Multiple-family residential.....	7.2%
Commercial.....	3.1%
Industrial.....	4.2%
Office.....	0.7%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 10

Inventory of Public Facilities

City Parks and Buildings:

Sycamore Park (10.4 acres)
Shubel Park (55.5 acres)
Sycamore Golf Course (54 acres)
Clifford Park (5.3 acres)
Lyons Playfield (5 acres)
Greencroft Park (1.5 acres)
Reola Park (0.6 acre)
Poxon Park (5 acres)
South Washington Park (49.9 acres)
Elmhurst Park (5 acres)
Quentin Park (10.2 acres)
Riverside Park (7.3 acres)
Moores Park (17.5 acres)

Community Center

There are approximately 65 miles of public streets, 44.1 miles of sewer lines, and 59.8 miles of public water mains.

Public Schools:

Barnes Elementary School, built in 1919, 13 rooms on 2 acres
Elmhurst Elementary School, built in 1950, 17 rooms on 9 acres
Maple Wood Elementary School, built in 1918, 13 rooms on 2.1 acres
Lyons Elementary School, built in 1952, 10 rooms on 4 acres
Mount Hope Elementary School, built in 1949, 12 rooms on 3.3 acres
Walter French Junior High School, built in 1924, 47 rooms on 6 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 63 acres.

ANALYSIS AREA 11

Analysis Area 11 is a recently annexed area whose western half is fairly well-developed, and contains a large proportion of single-family homes that are lower middle class. Although there are swampy areas in the center of the analysis area, the eastern half is rapidly growing with new subdivision and apartment development. It is highly accessible to the rest of the region due to the freeway extension which runs through it.

The initial population of households is distributed among the five household types as follows:

Type I -- 12.2%
Type II -- 15.7%
Type III -- 32.4%
Type IV -- 33.4%
Type V -- 6.3%

The overall residential density is 3.2 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 12.6%
R-2 -- 23.4%
R-3 -- 25.2%
M-1 -- 17.3%
M-2 -- 21.5%

Of a total land area for analysis area 11 of 4639 acres, 17% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	35.5%
Multiple-family residential.....	2.7%
Commercial.....	1.4%
Industrial.....	0.2%
Office.....	3.8%
Agricultural.....	39.5%

(continued next page)

ANALYSIS AREA 11

Inventory of Public Facilities

City Parks and Buildings:

Cavanaugh Park (5 acres)
Kendon Park (5.6 acres)
Waldo Park (0.5 acres)
Everett Park (3 acres)
Poxon Park (12 acres)
Arboretum Park (120 acres)
Scott Park (70 acres)

Fire Station #9
Branch Library

There are approximately 46 miles of public streets, 21.4 miles of sewer lines and 24.2 miles of public water mains.

Public Schools:

Forest Road Elementary School, built in 1889, 4 rooms on 5 acres
Forest View Elementary School, built in 1957, 9 rooms on 10 acres
Everett Elementary School, built in 1923, 20 rooms on 9 acres
Maple Hill Elementary School, built in 1952, 10 rooms, 0.6 acre
Cavanaugh Elementary School, built in 1958, 18 rooms on 10 acres
Kendon Elementary School, built in 1959, 14 rooms on 10 acres
Everett High School, built in 1960, 66 rooms on 57 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 83 acres.

ANALYSIS AREA 12

Analysis Area 12 is an area of high growth potential whose past develop- was largely before its incorporation into the Central City. It is largely blue collar, single-family homes, with few improvements in the area to the south. The northern half of the analysis area was built up 20-30 years ago, whereas the growth of the southern half has coincided with the coming of the expressway. The southern half of the analysis area was just annexed and needs improvements in facilities to come up to city standards. New development is expected to be more middle class and considerable commercial development about the interchange is expected by some parts of the business community.

The initial population of households is distributed among the five household types as follows:

Type I -- 7.3%
Type II -- 12.7%
Type III -- 32.7%
Type IV -- 38.5%
Type V -- 8.8%

The overall residential density is 3.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 9.1%
R-2 -- 21.9%
R-3 -- 27.3%
M-1 -- 16.6%
M-2 -- 25.1%

Of a total land area for analysis area 12 of 5245 acres, 64% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	72.6%
Multiple-family residential.....	2.8%
Commercial.....	less than 1%
Industrial.....	8.1%
Office.....	0.2%
Agricultural.....	2.7%

(continued next page)

ANALYSIS AREA 12

Inventory of Public Facilities

City Parks and Buildings:

Pleasant View Park (9.9 acres)
Ingham Park (11.8 acres)
Wainwright Park (5.4 acres)
Maple Grove Park (4 acres)
Attwood Park (5.1 acres)

Fire Station #10
2 Branch Libraries

There are approximately 64 miles of public streets, 31.2 miles of sewer lines, and 34.5 miles of public water mains.

Public Schools:

Pleasant Grove Elementary School, built in 1929, 19 rooms on 3.1 acres
Wainwright Elementary School, built in 1960, 21 rooms on 5 acres
Pleasant View Elementary School, built in 1954, 12 rooms on 11.4 acres
Harley Franks Elementary School, built in 1960, 10 rooms on 30 acres
Maple Grove Elementary School, 18 rooms on 10 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 3 acres.

ANALYSIS AREA 13

Analysis Area 13 lies in the corridor of rapid growth to the south of the metropolitan region. Older homes are small blue collar single-family homes 30+ years old, predating incorporation into the city, whereas newer homes are middle and upper middle class subdivisions, including apartment complexes. The eastern half of the area is fairly swampy and has no access to the expressway, so little growth is expected there, whereas residential, commercial and industrial development are all expected in the western half of the analysis area around the expressway interchange.

The initial population of households is distributed among the five household types as follows:

Type I -- 7.6%
Type II -- 14.2%
Type III -- 32.0%
Type IV -- 34.2%
Type V -- 12.0%

The overall residential density is 4.0 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 7.8%
R-2 -- 18.5%
R-3 -- 22.8%
M-1 -- 20.7%
M-2 -- 30.2%

Of a total land area for analysis area 13 of 6641 acres, 48.4% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	44.0%
Multiple-family residential.....	1.3%
Commercial.....	1.1%
Industrial.....	10.5%
Office.....	1.2%
Agricultural.....	31.7%

(continued next page)

ANALYSIS AREA 13

Inventory of Public Facilities

City Parks and Buildings:

No Parks

Branch Library
Community Center

There are approximately 40 miles of public streets, 11.6 miles of sewer lines and 3 miles of public water mains.

Public Schools:

North Elementary School, built in 1924, 26 rooms on 10.6 acres
Island Elementary School, built in 1886, 3 rooms on 4 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 43 acres.

ANALYSIS AREA 14

Analysis Area 14 is a rural area in which little or no urban development is currently taking place. The swampy soil make housebuilding costly. Sod farming, truck gardening and dairying are the major land uses. The resident population is largely what is called "rural non-farm", i.e., people who live in the country but work in the city. They are overwhelmingly semi-skilled workers in the factories and construction trades, who are avoiding taxes, high rents and building codes by living in the rural areas. Many retired farmers also live in the area.

The initial population of households is distributed among the five household types as follows:

Type I -- 6.5%
Type II -- 10.8%
Type III -- 28.1%
Type IV -- 43.1%
Type V -- 11.5%

The overall residential density is 1.8 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 8.2%
R-2 -- 21.5%
R-3 -- 30.0%
M-1 -- 14.6%
M-2 -- 25.7%

Of a total land area for analysis area 14 of 30,988 acres, 10.9% is vacant initially. The privately-owned land is development or zoned for development according to the following percentages:

Single-family residential.....	6.2%
Multiple-family residential.....	0.4%
Commercial.....	0.7%
Industrial.....	7.0%
Office.....	0.1%
Agricultural.....	79.0%

(continued next page)

ANALYSIS AREA 14

Inventory of Public Facilities

City Parks and Buildings:

Riverside Park (0.4 acre)
Bath Park (0.5 acre)

2 Township Halls

There are approximately 180 miles of public streets, 5 miles of sewer lines and no public water mains.

Public Schools:

James Couzens Elementary School, built in 1952, 18 rooms on 12 acres
Gunnisonville Elementary School, built in 1900, 7 rooms on 5.8 acres
James Couzens Junior High School, built in 1927, 13 rooms
James Couzens High School, built in 1961, 14 rooms on 10 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 749 acres, much of this a State park.

ANALYSIS AREA 15

Analysis area 15 is a part of the urbanizing Townships that is in transition from predominately rural non-farm blue collar population to middle and upper middle class subdivisions. The influx of suburbanites who want more urban services creates conflicts with older residents who want low taxes. The north-west corner subdivision is an old blue collar rural slum that contains a higher percentage of deteriorated housing than downtown areas. The Suburb has grown up to it, and is separated from it by an eight-foot high brick wall that runs for half a mile along Lake Lansing road. New subdivisions tend to be upper middle class. Heavy strip commercial development runs along the arterial at the southern boundry.

The initial population of households is distributed among the five household types as follows:

Type I -- 26.8%
Type II -- 16.0%
Type III -- 18.0%
Type IV -- 29.1%
Type V -- 10.1%

The overall residential density is 1.6 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 18.6%
R-2 -- 22.7%
R-3 -- 22.8%
M-1 -- 15.7%
M-2 -- 20.2%

Of a total land area for analysis area 15 of 3835 acres, 37.8% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	55.8%
Multiple-family residential.....	1.8%
Commercial.....	1.7%
Industrial.....	0.5%
Office.....	0.1%
Agricultural.....	27.9%

(continued next page)

5-30

ANALYSIS AREA 15

Inventory of Public Facilities

City Parks and Buildings:

None

There are 23 miles of public streets, 7 miles of sewer lines and no public water mains.

Public Schools:

Donley Elementary School, built in 1951, 12 rooms on 20.6 acres
Towar Elementary School, built in 1936, 4 rooms on 1.1 acres
Wardcliff Elementary School, built in 1955, 14 rooms on 20 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 169.3 acres.

ANALYSIS AREA 16

Analysis Area 16 consists of an old and a new subdivision, sitting side by side next to a deteriorating lake. Buildings around the lake date back to the turn of the century, when it was a major recreational area, and are largely inhabited by blue collar households. The new subdivision slightly to the south is middle class and about 10 years old. The area has a steady population growth of an uncontrolled type along the major roads (including new apartment houses, to the chagrin of middle class homeowners). There is practically no commercial development in the area, and the tax base is low.

The initial population of households is distributed among the five household types as follows:

Type I -- 22.3%
Type II -- 19.4%
Type III -- 26.9%
Type IV -- 25.3%
Type V -- 6.1%

The overall residential density is 2.2 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 17.9%
R-2 -- 23.9%
R-3 -- 21.7%
M-1 -- 17.6%
M-2 -- 18.9%

Of a total land area for analysis area 16 of 5777 acres, 51.5% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	60.9%
Multiple-family residential.....	2.8%
Commercial.....	0
Industrial.....	0.2%
Office.....	1.0%
Agricultrual.....	28.2%

ANALYSIS AREA 16

Inventory of Public Facilities

City Parks and Buildings:

Meridian Park (4 acres)
Lake Lansing Park (9.4 acres)

No city buildings

There are 38 miles of public streets, 17.8 miles of sewer lines, and 4.2 miles of public water mains.

Public Schools:

Murphy Elementary School, built in 1961, 5 rooms on 5 acres
Wilkshire Elementary School, built in 1957, 15 rooms on 10 acres
Central Elementary School, built in 1950, 16 rooms on 10 acres
Haslett Junior High School, built in 1933, 16 rooms on 5 acres
Haslett High School, built in 1957, 25 rooms on 27 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 3 acres.

ANALYSIS AREA 17

Analysis Area 17 is the northern portion of the Suburb, and contains most of the remaining land available for new development within the city limits. This analysis area contains some of the most expensive new houses in the metropolitan area (though not the most prestigious). The population is overwhelmingly professional and managerial families. The southermost parts of the analysis area are 30-40 years old, while the northern parts are brand new. Apartment complexes line the expressway in the western half. The Suburb's best park is in this analysis area.

The initial population of households is distributed among the five household types as follows:

Type I -- 48.8%
Type II -- 20.5%
Type III -- 15.1%
Type IV -- 12.8%
Type V -- 2.8%

The overall residential density is 2.6 households per developed residential acre. The population is found in the five residential developtypes as follows:

R-1 -- 23.5%
R-2 -- 26.4%
R-3 -- 12.8%
M-1 -- 18.4%
M-2 -- 10.9%

Of a total land area for analysis area 17 of 1634 acres, 15.3% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	44.5%
Multiple-family residential.....	5.0%
Commercial.....	3.5%
Industrial.....	less than .1%
Office.....	less than .1%
Agricultural.....	27.0%

(continued next page)

ANALYSIS AREA 17

Inventory of Public Facilities

City Parks and Buildings:

City Park (38 acres)

Water Treatment Plant

There are approximately 32 miles of public streets, 20.8 miles of sewer lines and 21.8 miles of public water mains.

Public Schools:

Pinecrest Elementary School, built in 1959, 11 rooms on 19 acres
Marble Elementary School, built in 1952, 21 rooms on 16 acres
East Lansing High School, built in 1956, 59 rooms on 50 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 6 acres.

ANALYSIS AREA 18

Analysis Area 18 is the oldest part of the Suburb, its shape shows the way development was strung out along Grand River Avenue. Single-family housing ranges from 20-50 years old, while the apartment houses are less than 15 years old (showing the competition for accessible sites that are still prestigious). The population is middle to upper class. The northwestern corner is an elite enclave, with fine older homes, containing about half of the reputational power structure of the metropolitan area. Strip commercial development is found all along Grand River Avenue, which though congested and heavily travelled, is still the fastest way to get to downtown in the Central City.

The initial population of households is distributed among the five household types as follows:

Type I -- 49.4%
Type II -- 23.3%
Type III -- 13.2%
Type IV -- 12.3%
Type V -- 1.8%

The overall residential density is 4.3 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 29.6%
R-2 -- 25.7%
R-3 -- 13.6%
M-1 -- 18.9%
M-2 -- 12.2%

Of a total land area for analysis area 18 of 888 acres, 3.7% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	58.3%
Multiple-family residential.....	4.0%
Commercial.....	5.8%
Industrial.....	0.2%
Office.....	0.1%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 18

Inventory of Public Facilities

City Parks and Buildings:

Arbor Park (3 acres)
Valley Court Park (5 acres)

Community Library

There are approximately 38 miles of public streets, 29.9 miles of sewer lines and 32.2 miles of public water mains.

Public Schools:

Glencairne Elementary School, built in 1950, 11 rooms on 5 acres
Central Elementary School, built in 1917, 10 rooms on 2 acres
Bailey Elementary School, built in 1922, 15 rooms on 6 acres
E. Lansing Junior High School, built in 1926, 34 rooms on 10 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 1 acre.

ANALYSIS AREA 19

Analysis Area 19 is dominated by the State University campus, which serves as both a cultural focus and an employment focus for the Suburb. 20,000 students live on campus and about 18,000 off campus. The western edge of the analysis area contains a small subdivision, and the southern half a large married student housing complex--these are the households of the area. The University is the second largest employer of metropolitan area workers and has about the same impact on the urban economy as a large electronics or R & D firm. The southern half of the analysis area consists largely of experimental farms belonging to the University.

The initial population of households is distributed among the five household types as follows:

Type I -- 34.6%
Type II -- 19.3%
Type III -- 20.4%
Type IV -- 23.2%
V -- 2.5%

The overall residential density is 7.3 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 23.2%
R-2 -- 25.0%
R-3 -- 18.1%
M-1 -- 18.3%
M-2 -- 15.4%

Of a total land area for analysis area 19 of 1730 acres, 2.1% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	36.9%
Multiple-family residential.....	1.4%
Commercial.....	5.3%
Industrial.....	4.6%
Office	4.9%

There is no agricultural land in this analysis area.

(continued next page)

ANALYSIS AREA 19

Inventory of Public Facilities

City Parks and Buildings:

No Parks

Sewage treatment plant
2 water filtration plants

There are approximately 32 miles of public streets, 22.9 miles of sewer lines and 14.6 miles of public water mains.

Public Schools:

Red Cedar Elementary School, built in 1948, 17 rooms on 11.3 acres
Spartan Village Elementary School, built in 1962, 4 rooms on 4.5 acres.

County Property:

None

State-owned and quasi-public land accounts for approximately 580 acres, most of it a State University, including 3 auditoriums, an art gallery and a museum.

ANALYSIS AREA 20

Analysis Area 20 is the oldest prestige area among the townships, and like the suburb, is predominately upper-middle class. It is continually vacillating about whether to incorporate as another suburb or not. It has been an area of recent rapid growth, both in terms of expensive subdivisions and townhouses. There is a small, old commercial center called Okemos, from which the area gets its name.

The initial population of households is distributed among the five household types as follows:

Type I -- 48.1%
Type II -- 20.6%
Type III -- 16.2%
Type IV -- 11.9%
Type V -- 3.2%

The overall residential density is 1.7 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 29.5%
R-2 -- 25.3%
R-3 -- 12.4%
M-1 -- 20.1%
M-2 -- 12.7%

Of a total land area for analysis area 20 of 4739 acres, 52% is vacant initially. The privately owned land is developed or zoned for development according to the following percentages:

Single-family residential.....	62.9%
Multiple-family residential.....	3.4%
Commercial.....	3.4%
Industrial.....	0.4%
Office.....	0.8%
Agricultural.....	19.8%

(continued next page)

ANALYSIS AREA 20

Inventory of Public Facilities

City Parks and Buildings:

Ferguson Park (6.3 acres)

Branch Library
Township Station #2

There are approximately 39 miles of public streets, 25 miles of sewer lines and 2.7 miles of public water mains.

Public Schools:

Cornell Elementary School, built in 1955, 14 rooms on 10 acres
Central Junior High School, built in 1922, 35 rooms on 19 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 98 acres.

ANALYSIS AREA 21

Analysis Area 21 is a fringe rural area to Okemos (Analysis Area 20) and will contain the next increment of eastward growth from the Suburb. At present it is slowly adding scattered new middle class homes, but is predominantly blue collar of the rural non-farm type (working in towns). Most of the land is currently in agricultural use.

The initial population of households is distributed among the five household types as follows:

Type I -- 26.8%
Type II -- 13.7%
Type III -- 22.3%
Type IV -- 29.6%
Type V -- 7.6%

The overall residential density is 1.3 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 18.6%
R-2 -- 26.3%
R-3 -- 23.1%
M-1 -- 14.4%
M-2 -- 17.6%

Of a total land area in analysis area 21 of 8466 acres, 16.6% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential..... 24.3%
Multiple-family residential..... 0.3%
Commercial..... 1.0%
Industrial.....less than .1%
Office.....0
Agricultural.....69.9%

(continued next page)

ANALYSIS AREA 21

Inventory of Public Facilities

City Parks and Buildings:

None

There are 31 miles of public streets, 1.1 miles of sewer lines and 0.8 mile public water mains.

Public Schools:

Okemos High School, built in 1922, 23 rooms on 78 acres

County Property:

None

State-owned and quasi-public land accounts for approximately 3.5 acres

ANALYSIS AREA 22

Analysis Area 22 is a rural area with relatively low accessibility to the adjoining metropolitan area. It is 95% in farmland, but a number of the farm owners are not active farmers, choosing to work in town instead or being retired farmers. The few middle class households in the area are scattered new exurban houses along the roads of the northern edge of the analysis area.

The initial population of households is distributed among the five household types as follows:

Type I -- 7.2%
Type II -- 11.8%
Type III -- 28.5%
Type IV -- 39.7%
Type V -- 12.8%

The overall residential density is 1.4 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 8.7%
R-2 -- 20.9%
R-3 -- 29.3%
M-1 -- 14.9%
M-2 -- 26.2%

Of a total land area for analysis area 22 of 23,689 acres, 0.1% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.... 1.8%
Multiple-family residential.. 0.2%
Commercial..... 0
Industrial..... 0
Office..... 0
Agricultural.....95.1%

ANALYSIS AREA 22

Inventory of Public Facilities

City Parks and Buildings:

None

There are 74 miles of public streets, no sewer lines and no water mains.

Public Schools:

Alaiedon Elementary School, built in 1961, 10 rooms on 10 acres

County Property:

None

State owned and quasi-public land accounts for approximately 59 acres.

ANALYSIS AREA 23

Analysis Area 23 is the extreme southermost end of the corridor of new growth going southward from the Central Business District. The area is predominantly rural non-farm populations who work in the factories in town. The northeast quarter of the area contains an old settlement that is being added to by new subdivisions. New as well as old families are blue collar workers who are buying a home to live in for life. Strip commercial development is found all along the state highway that runs through the northeast corner, as well as a few scattered industrial sites. The analysis area is growing faster than most of the fringe areas.

The initial population of households is distributed among the five household types as follows:

Type I -- 12.0%
Type II -- 15.3%
Type III -- 31.5%
Type IV -- 31.8%
Type V -- 9.4%

The overall residential density is 2.1 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 12.4%
R-2 -- 25.8%
R-3 -- 30.5%
M-1 -- 13.2%
M-2 -- 18.1%

Of a total land area for analysis area 23 of 15,765 acres, 51.4% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....22.9%
Multiple-family residential.. 0.6%
Commercial.....26.7%
Industrial..... 6.5%
Office..... 3.5%
Agricultural.....34.6%

ANALYSIS AREA 23

Inventory of Public Facilities

City Parks and Buildings:

Kiwanis City Park (5.3 acres)

Township Fire Station

There are approximately 66 miles of public streets, 18.6 miles of sewer lines and no public water mains.

Public Schools:

Midway Elementary School, built in 1949, 19 rooms on 9 acres
Elliott Elementary School, built in 1952, 13 rooms on 10 acres
Sycamore Elementary School, built in 1952, 13 rooms on 10 acres
Holt Junior High School, built in 1914, 23 rooms on 3 acres
Holt High School, built in 1956, 23 rooms on 36 acres

County Property:

None

State owned and quasi-public land accounts for approximately 70 acres.

ANALYSIS AREA 24

Analysis Area 24 is a rural area in the southwest corner of the metropolitan region. While nearly 90% of the area is farmland, few farms are actively worked, because most farmowners work in town. 80% of the residents are blue collar workers; most of them work in factories. Most housing in the area is more than 50 years old. There is little new growth.

The initial population of households is distributed among the five household types as follows:

Type I -- 8.5%
Type II -- 10.4%
Type III -- 26.1%
Type IV -- 41.6%
Type V -- 13.4%

The overall residential density is 1.0 household per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 8.7%
R-2 -- 23.2%
R-3 -- 33.5%
M-1 -- 12.2%
M-3 -- 22.6%

Of a total land area for analysis area 24 of 24,186 acres, 4.6% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential.... 3.3%
Multiple-family residential.. 0.3%
Commercial..... 0
Industrial..... 0.1%
Office..... 4.4%
Agricultrual.....86.8%

ANALYSIS AREA 24

Inventory of Public Facilities

City Parks and Buildings:

No Parks

Township Hall

There are approximately 193 miles of public streets, no sewer lines and no public water mains.

Public Schools:

Dimondale Elementary School, built in 1951, 13 rooms on 13.6 acres

County Property:

None

State owned and quasi-public land accounts for approximately 113 acres.

ANALYSIS AREA 25

Analysis Area 25 is undergoing rapid growth along the highway that cuts it diagonally from northeast to southwest. Some riverfront areas are attracting middle class homes, but most development is blue collar, rural non-farm. While 60% of the area is in farmland, most of these farms are being held in anticipation of future subdivisions, or are idle while the owner works in a factory in town.

The initial population of households is distributed among the five household types as follows:

Type I -- 19.9%
Type II -- 12.0%
Type III -- 29.3%
Type IV -- 34.0%
Type V -- 4.8%

The overall residential density is 1.1 household per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 16.7%
R-2 -- 21.5%
R-3 -- 22.6%
M-1 -- 20.4%
M-2 -- 18.8%

Of a total land area for analysis area 25 of 4500 acres, 14.7% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....10.9%
Multiple-family residential.. 1.2%
Commercial..... 1.4%
Industrial.....13.6%
Office..... 1.4%
Agricultural.....56.5%

(Continued on next page)

ANALYSIS AREA 25

Inventory of Public Facilities

City Parks and Buildings:

None

Township Fire Station

There are approximately 18 miles of public streets, 0.6 miles of sewer lines, and no public water mains.

Public Schools:

Snow Road Elementary School, built in 1955, 4 rooms on 13 acres.

County Property:

None

State-owned and quasi-public land accounts for approximately 389.5 acres.

ANALYSIS AREA 26

Analysis Area 26 is a fringe rural area that is seeing its first subdivisions largely because of the freeway interchange and the leapfrogging of development over speculatively held farmland closer to town. New subdivsions are middle class, while older housing is scattered along rural roads and is blue collar rural non-farm households. While nearly all land in the southern half is farmland it is not in steady production - the owners tend to work in factories or to be retired farmers.

The initial population of households is distributed among the five household types as follows:

Type I -- 17.0%
Type II -- 17.0%
Type III -- 26.6%
Type IV -- 26.6%
Type V -- 12.8%

The overall residential density is 1.1 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 11.9%
R-2 -- 17.7%
R-3 -- 17.5%
M-1 -- 22.6%
M-2 -- 30.3%

Of a total land area for analysis area 26 of 16,146 acres, 5.3% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....	9.9%
Multiple-family residential..	1.2%
Commercial.....	0
Industrial.....	less than .1%
Office.....	0.9%
Agricultural.....	81.9%

(Continued on next page)

ANALYSIS AREA 26

Inventory of Public Facilities

City Parks and Buildings:

No Parks

No City Buildings

There are approximately 65 miles of public streets, 1.5 miles of sewer lines and no public water mains.

Public Schools:

Delta Center Elementary School, built in 1958, 9 rooms on 40 acres.

County Property:

None

State owned and quasi-public land accounts for approximately 32 acres.

ANALYSIS AREA 27

Analysis Area 27 is an urban fringe area that has been growing steadily for twenty years as the city has spilled over to the west. The northern half is heavily upper class subdivisions, while the southern half is more moderately priced homes, with a mix of white collar and blue collar families. Farms are being held speculatively in anticipation of future urban growth.

The initial population of households is distributed among the five household types as follows:

Type I -- 23.1%
Type II -- 19.4%
Type III -- 29.7%
Type IV -- 23.5%
Type V -- 4.3%

The overall residential density is 1.5 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 19.5%
R-2 -- 26.7%
R-3 -- 22.9%
M-1 -- 16.0%
M-2 -- 14.9%

Of a total land area for analysis area 27 of 4569 acres, 14.0% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....	30.1%
Multiple-family residential..	1.3%
Commercial.....	2.2%
Industrial.....	0
Office.....	0
Agricultural.....	51.2%

(Continued on next page)

ANALYSIS AREA 27

Inventory of Public Facilities

City Parks and Buildings:

Grand Woods Park (139 acres)

Township Hall

There are approximately 35 miles of public streets, 6 miles of sewer lines and 18 miles of public water mains.

Public Schools:

Bretton Woods Elementary School, built in 1930, 12 rooms on 5 acres
Colt Elementary School, built in 1962, 13 rooms on 33 acres

County Property:

None

State owned and quasi-public land accounts for approximately 184 acres.

ANALYSIS AREA 28

Analysis Area 28 has two kinds of land use: the northern 3/4 is farmland untouched by urban development for the foreseeable future, and the southeastern edge along the highway is scattered residential and industrial development. Most households in the analysis area are rural non-farm blue collar workers who work in factories in town.

The initial population of households is distributed among the five household types as follows:

Type I -- 8.8%
Type II -- 12.3%
Type III -- 24.0%
Type IV -- 39.9%
Type V -- 15.0%

The overall residential density is 1.0 household per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 8.6%
R-2 -- 24.8%
R-3 -- 37.6%
M-1 -- 9.6%
M-2 -- 19.4%

Of a total land area in analysis area 28 of 24,096 acres, 10.4% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....	3.6%
Multiple-family residential..	0.3%
Commercial.....	less than .1%
Industrial.....	10.2%
Office.....	0.1%
Agricultural.....	81.4%

(Continued on next page)

ANALYSIS AREA 28

Inventory of Public Facilities

City Parks and Buildings:

Looking Glass Valley Park (4 acres)

No city buildings

There are approximately 72 miles of public streets, no sewer lines and no public water mains.

Public Schools:

None

County Property

None

State owned and quasi-public land accounts for approximately 147 acres.

ANALYSIS AREA 29

Analysis Area 29 contains the metropolitan airport in the southwestern corner. It is an area in which the local township government has in the past resisted urban growth and has not encouraged subdivisions. Most of the homes in the southeastern section are over 30 years old, and were often built by the owners. Most of the population of the area is blue collar, rural non-farm, working in town. The northern half of the analysis area is farmland in irregular production.

The initial population of households is distributed among the five household types as follows:

Type I -- 10.5%
Type II -- 11.9%
Type III -- 28.9%
Type IV -- 38.8%
Type V -- 9.9%

The overall residential density is 1.7 households per developed residential acre. The population is found in the five residential development types as follows:

R-1 -- 10.5%
R-2 -- 22.3%
R-3 -- 27.9%
M-1 -- 15.5%
M-2 -- 23.8%

Of a total land area in analysis area 29 of 18,574 acres, 4.0% is vacant initially. The privately-owned land is developed or zoned for development according to the following percentages:

Single-family residential....	7.6%
Multiple-family residential..	0.4%
Commercial.....	0
Industrial.....	0
Office.....	0.3%
Agricultural.....	88.0%

(Continued on next page)

ANALYSIS AREA 29

Inventory of Public Facilities

City Parks and Buildings:

No parks

Township Hall

There are approximately 43 miles of public streets, 0.6 miles of sewer lines and 1.3 miles of public water mains.

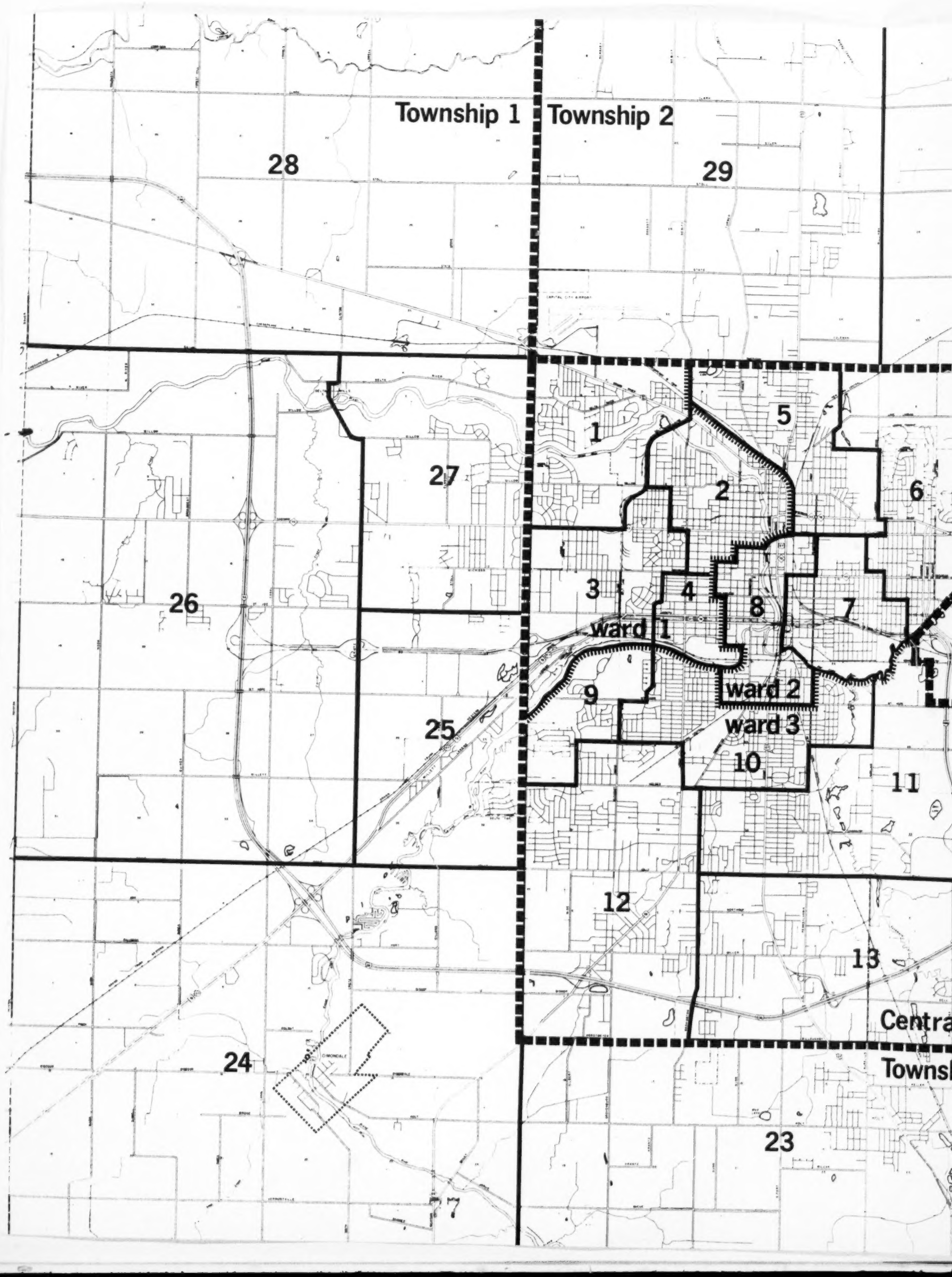
Public Schools:

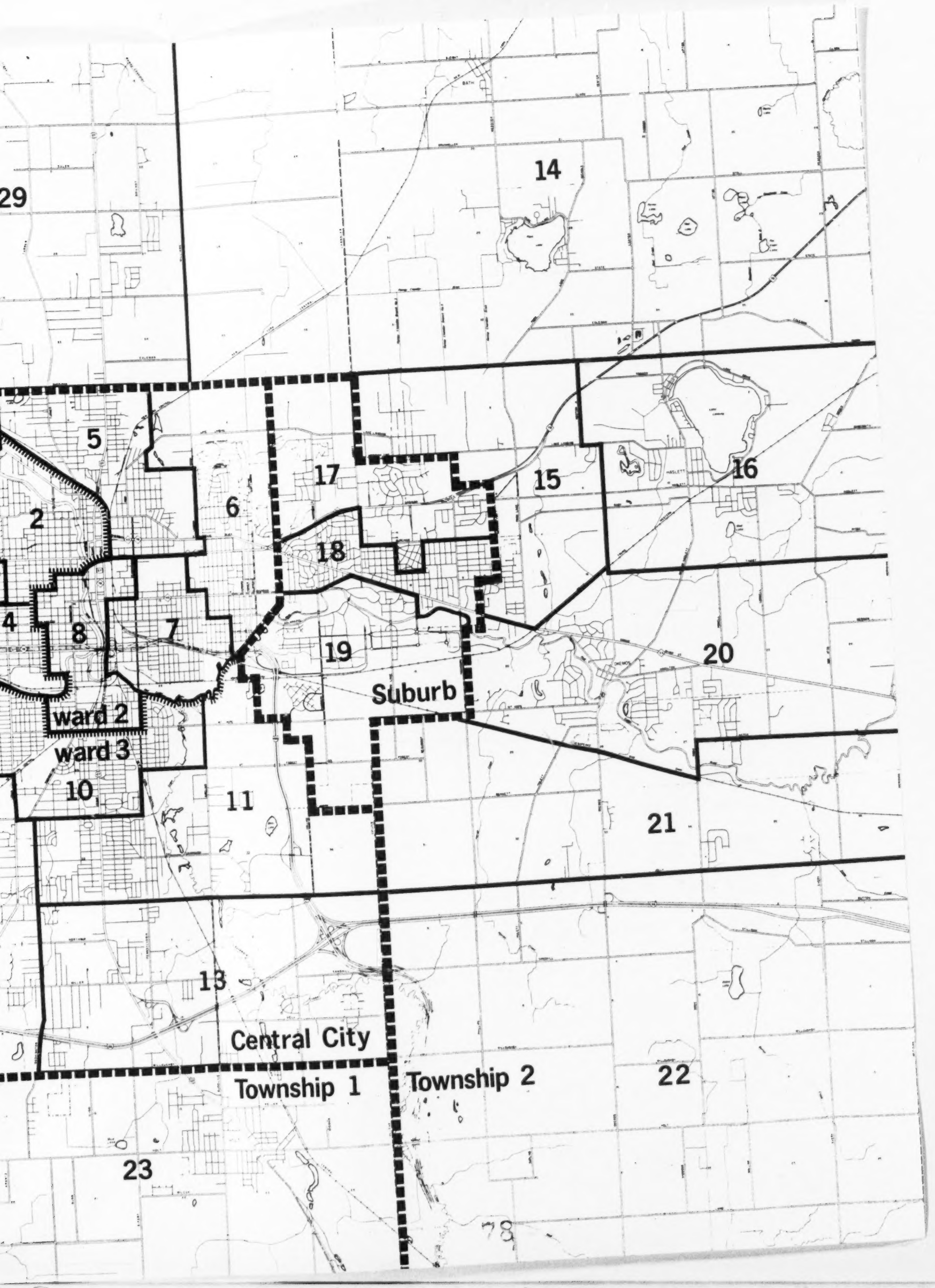
Valley Farms Elementary School, built in 1949, 13 rooms on 12.4 acres
Sheridan Road Elementary School, built in 1920, 24 rooms on 9.2 acres
Hurd Elementary School, built in 1955, 5 rooms on 2 acres

County Property:

Airport (1000 acres)

State owned and quasi-public land accounts for approximately 27 acres.


Township 1
Township 2
28
29
27
26
25
24
23
1
2
3
4
5
6
7
8
9
10
11
12
13
ward 1
ward 2
ward 3


29
14
5
17
15
16
2
6
18
4
8
7
19
20
Suburb
ward 2
ward 3
10
11
21
13
Central City
Township 1
Township 2
22
23

● 29 APEX ANALYSIS AREAS

TOWNSHIP 1

Areas 23, 24, 25, 26, 27 and 28

TOWNSHIP 2

Areas 14, 15, 16, 20, 21, 22 and 29

SUBURB

Areas 17, 18 and 19

CENTRAL CITY

Ward One: Areas 1, 2, 3, and 4

Ward Two: Areas 5, 6, 7 and 8

Ward Three: Areas 9, 10, 11, 12 and 13